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Firm Size and Export Intensity: Solving an Empirical Puzzle

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This paper presents a transaction costs analysis of the firm size and export intensity relationship. We submit that relation-specific investments and the costs of safeguarding these investments play a significant role in export relationships. Firm size related differences with respect to these factors are used to explain the different relationships between firm size and export intensity that have been found in previous studies. The theoretical framework is tested empirically, and support is found for different industries.

INTRODUCTION

The relationship between firm size and export performance has been studied frequently in the international marketing literature. There is general consensus in the literature that firm size is positively related to the firm's propensity to export (e.g., Bonaccorsi, 1992; Christensen et al., 1987). However the empirical findings on the relationship between firm size and export intensity, defined as the ratio of exports to total sales, have been mixed. Some studies report a positive relationship between firm size and export intensity (e.g., Wagner, 1995; O'Rourke, 1985). Other studies report that firm size has little or no influence (e.g., Wolf and Pett, 2000; Bonaccorsi, 1992). Finally, a few studies report a negative relationship between firm size and export intensity (e.g., Patibandla, 1995). In this paper, we use transaction cost analysis to solve this empirical puzzle.

There are good reasons to use transaction costs analysis to explain the firm

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size and export intensity relationship. Transaction costs theory states that transaction costs are particularly important in situations where economic actors make relation-specific investments under uncertain conditions (Williamson, 1985). Export relationships require considerable specific investments, e.g. the costs of adjusting products and company procedures to differences in for example, culture, laws and technology of foreign buyers. Moreover, uncertainty in export relationships is generally high because of the difficulty to enforce contracts across borders and the information asymmetry and geographical distance between the exchange partners (e.g., Bello and Gilliland, 1997).

The paper proceeds as follows. First, we discuss in some detail the implications of transaction costs theory for the firm size and export intensity relationship. We submit that relation-specific investments and the costs of safeguarding these investments play a significant role in export relationships. Firm size related differences with respect to these factors are used to explain the different relationships between firm size and export intensity that have been found in previous studies. Next, we present the data and empirically examine the proposed theoretical framework. The paper concludes with a discussion of the implications of the results and suggestions for future research.

THEORETICAL FRAMEWORK

This section starts with a transaction costs analysis of export relationships. We then refine the transaction costs theory to distinguish between firms of different sizes and discuss the implications for the firm size and export intensity relationship.

A Transaction Costs Analysis of the Firm Size and Export Intensity Relationship

Initially, transaction costs theory focused on the individual transaction as the unit of analysis (Coase, 1937). This ignored that the sequence of transactions within a given relationship has implications for how an individual transaction is organized (Nooteboom, 1993b; Sahlins, 1972). For example, prior experience with a particular exchange partner may reduce the need for governance in subsequent transactions (Gulati, 1995). Williamson (1985, p.72) contrasts the neoclassical system with what he calls a truly relational approach. His analysis is largely based on the relational contract, which refers to the series of transactions with a given transaction partner through time. In this study we adopt Williamson's relational approach and use the export relationship as the unit of analysis. An export relationship is defined as the series of transactions in time with a particular foreign buyer.

Transaction costs economies have particular importance in situations where economic actors make relation-specific investments, i.e. investments that are to some extent specific to a particular set of individuals or assets (Williamson, 1985, p. 30). Because contractual agreements can never be complete, relation-specific investments cause dependence between the exchange partners. This contractual uncertainty creates a vulnerability to opportunistic behavior of exchange partners. Therefore, relation-specific investments give rise to structures that safeguard these investments (governance structures).

In the context of export relationships, relation-specificity relates to investments that support an export relationship and are difficult or expensive to transfer to other exchange relationships. Such costs include the costs of adapting the company's products and internal processes to accommodate a foreign buyer and the costs of special training and allocation of managerial resources. The need for specific adaptation, special training and managerial attention increases with the differences between the exchange partners (Hakansson and Gadde, 1997, p. 407). Consequently, the many differences in language, culture, taste, technology, logistics and laws between exchange partners in export relationships result in substantial relation-specific investments.

According to transaction costs theory, the high levels of relation specific investments in export relationships make the exporter vulnerable to opportunistic behavior of the foreign buyer. The hazards of opportunistic behavior may be even more prevalent in export relationships because of information asymmetry and geographical distance between the exchange partners. For example, it may be more difficult to assess the true capabilities of a foreign distributor and monitor its performance. Moreover, uncertainty in export relationships will be higher because of the difficulty to enforce contracts across borders. Therefore, high costs are incurred to safeguard the relation-specific investments in export relationships. A variety of formal and informal governance structures exist to safeguard relation-specific investments such as incentive design, monitoring, partner selection procedures, credible commitments and development of relational norms (Stump and Heide, 1996). For smaller export relationships, trilateral governance (the use of a third party with local presence) can be used. As the need for and the costs of such governance structures might vary substantially with the size of a firm, transaction costs theory may also be relevant for the firm size and export intensity relationship. Next, we discuss from a transaction costs perspective the central themes of the firm size and export intensity debate, i.e. economies of scale, risk perception and resources, see Bonaccorsi (1992).

Economies of scale. Sources of economies of scale are specialization, laws of mathematics and physics and indivisibility of people and facilities. Indivisibility results in what are called 'threshold costs': no matter how small output may be, there is a minimum capacity of people or facilities. Particularly this source of economies of scale is relevant to the costs of setting up governance structures. Such costs include the costs of setting up and executing an appointment with a (potential) foreign buyer, judging its perspective, making an offer, setting up a contract and channels of communication, and setting up a scheme of control (Nooteboom, 1993a).

In transaction costs theory, economies of scale are related to the volume of transactions that is processed through a specialized governance mechanism (Williamson, 1985, p. 60). Although firm size might capture the economies of scale of production costs, it does not capture the economies of scale of relation-specific investments and the related governance costs. These economies of scale are captured by the size of the export relationship. Following Williamson (1985), export relationship size is defined as the volume of export transactions in time with a particular foreign buyer. The size of export relationships might be associated with the size of the firm, but small firms may also be able to realize economies of scale when they specialize in exports and develop export relationships of significant size. Thus, we expect that the size of the export relationship will be an influential determinant of export intensity, regardless of the size of the firm. More precisely, firms with large export relationships benefit from economies of scale of transaction costs and therefore have higher export intensities.

Hypothesis 1: Export relationship size is positively related to export intensity.

Risk perception. As the costs of governance structures are increased by the level of uncertainty in export relationships, management's risk perception influences these costs. Nooteboom (1993a, p. 291) argues that the vulnerability of large firms to opportunism tends to be smaller because the risk can be compensated with other transactions, contributing to lower costs of governance structures. However, Philp (1997) reports that the perceived risk in exporting is not an explanatory variable in distinguishing very small exporting firms from their larger counterparts, while Bonaccorsi (1992) argues that smaller firms can exit with lower costs. Thus, it is not clear how risk perception can explain firm size related differences in the costs of governance structures in export relationships.

Resources. The availability of resources offers substantive support for the first phases of developing export relationships (Gomes and Ramaswamy, 1999) but it may also influence the costs of governance structures in export relationships. For example, the costs of setting up governance structures may be higher for smaller firms, due to the lack of a systematic and reliable formal information system in smaller firms (Nooteboom, 1993a). Furthermore, small exporters sooner invest in relation-specific investments because small firms typically cannot aim at a low costs strategy in a large market but need to go for a differentiation strategy (Nooteboom, 1993a). Thus, in the first phases of developing an export relationship small firms have a greater need for governance structures and incur higher costs in setting up these structures.

As export relationships grow, adaptation to the requirements of foreign buyers becomes more important (Ford and Rosson, 1997). The exporting firm will need more complex inter- and intra-organizational co-ordination in order to meet these requirements (Gomes and Ramaswamy, 1999). Smaller firms are seen as being quicker and more nimble than their larger counterparts due to structural simplicity (Chen and Hambrick, 1995), and therefore may be more efficient in responding to the specific requirements of foreign buyers. Such efficient adaptation reduces the level of relation-specificity and consequently the costs of governance structures of smaller firms. Thus, as export relationship size increases, small firms reduce their disadvantage of higher relation-specific investments and increase their advantage of quick and efficient adaptation.

Summarizing the above reasoning, we conclude that for small export relationship sizes, small firms have a greater need of governance structures and in addition have the disadvantage of fewer resources, leading to lower levels of export intensity. However, as export relationships become larger small firms increase their advantage of structural simplicity, which is a competitive advantage that might result in higher export intensities. The different types of resources and different needs for governance structures for small and large firms induce a moderating effect of export relationship size on the firm size and export intensity relationship.

Hypothesis 2: The relationship between firm size and export intensity is moderated by the size of export relationships.

DATA AND MODEL SPECIFICATION

A randomly selected sample of firms from a database held by the Dutch tax authorities is used for estimation. All firms with international trade activities are registered in this database if they perform legal import or export activities. A large number of exporting firms of various sizes and operating in different economic sectors use the Netherlands as a European trading base. This provides the opportunity to select a sample from a large variety of firms in similar institutional environments. Another important advantage of this database is that all exporting firms are included, even firms with a very small size of export trade. It would be difficult to identify such firms without this database. Excluding these firms would affect the outcome of the relationship between firm size and export intensity, as indicated by the theory.

The database was constructed from a survey of 2,988 firms active in international trade activities (imports, exports and logistical services), of which 642 (21.5%) responded after one reminder. The response was tested for representativeness with respect to the size and industry type of respondents. A comparison did not indicate significant differences except that firms with more than 100 employees had a higher response rate than smaller firms.

Our analysis concerns the effect of firm size and export relationship size on export intensity. The variables used in the analysis are described below and summary statistics are presented in Table 1.

Expint: value of exports as a fraction of total sales of the firm

Log(*Firmsize*): log of the number of employees of the firm

Log(*Exportrel*): log of the firm's average annual value of transactions per foreign buyer

TABLE 1
MEANS, STANDARD DEVIATIONS AND CORRELATIONS

Variable	Mean	Standard Deviation	Expint	Log(*Firmsize*)
Expint	0.329	0.323		
Log(*Firmsize*)	2.195	1.581	0.308**	
Log(*Exportrel*)	9.894	2.651	0.358**	0.454**

Note: ** indicates $p < 0.001$.

In our analysis we use linear regression techniques. The dependent variable is export intensity, *Expint*. Following previous transaction costs studies of buyer-seller relationships (Andersen and Buvik, 2001; Heide and Miner, 1992) the export relationship size is measured as the natural logarithm of the firm's average annual value of transactions per foreign buyer. The explanatory variables we use are Log(*Firmsize)* and Log(*Exportrel)* and not *Firmsize* and *Exportrel,* as we expect that relative changes are more meaningful than absolute changes in these variables. The effect of an increase in a firm's number of employees with 10 employees might be substantial for a firm with 2 employees, while it will only be small for a firm with 500 employees. A change in a firm's number of employees with 10% might have a similar effect for both the small and the large firm. The same argument also holds for the size of the export relationship. To make sure that our results are not driven by a restrictive specification of the functional form, second-order terms have been included. Dummies for the types of goods have been included, but these proved to be insignificant. The resulting mathematical specification of our model is therefore:

$$Expint = \alpha_0 + \alpha_1 \mathrm{Log}(Firmsize) + \alpha_2 \mathrm{Log}(Firmsize)^2 + \alpha_3 \mathrm{Log}(Exportrel) + \alpha_4 \mathrm{Log}(Exportrel)^2 + \alpha_5 \mathrm{Log}(Firmsize) \times \mathrm{Log}(Exportrel) + \varepsilon$$

ESTIMATION RESULTS AND CONCLUSIONS

The estimation results of our model are presented in Table 2. We estimate the model using all observations, but we also perform our analysis for firms that are mainly active in manufacturing and for firms that are mainly active in trade separately. The three estimated models are highly significant, with p-values below 0.1%.

Significance levels for tests of the two hypotheses can be derived from tests on

TABLE 2
PARAMETER ESTIMATES AND P-VALUES

	Manufacturing		Trade		Total Sample	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
Constant (α_0)	−0.848	0.007	0.338	0.088	0.086	0.528
Log(*Firmsize*) (α_1)	0.158	0.116	0.222	0.002	0.086	0.066
Log(*Firmsize*)^2 (α_2)	0.023	0.072	0.001	0.935	0.011	0.147
Log(*Exportrel*) (α_3)	0.118	0.010	−0.108	0.008	−0.031	0.232
Log(*Exportrel*)^2 (α_4)	−0.001	0.504	0.010	0.000	0.005	0.001
Log(*Firmsize*) × Log(*Exportrel*) (mean-centered) (α_5)	−0.019	0.029	−0.021	0.003	−0.011	0.026
F-value		11.280		8.613		14.056
Model significance		0.0001		0.0001		0.0001
N		57		183		288
Adjusted R^2		0.520		0.195		0.200

parameter restrictions in the model. For hypothesis 1, this test is based on the joint significance of all variables relating to the export relationship size. The p-values for this test equal 0.006 for manufacturing, 0.000 for trade and 0.000 for the total sample. The estimation results therefore indicate a highly significant relationship between export intensity and the average size of export relationships.

Hypothesis 2 can be tested with a test on the significance of the interaction effect. The corresponding p-values in Table 2 are 0.029 for manufacturing, 0.003 for trade and 0.026 for the total sample. These suggest that the strength of the relationship between firm size and export intensity is significantly moderated by the size of export relationships. To examine the nature of this moderating effect, we present in Figures 1 and 2 the predicted levels of export intensity according to the estimated model for, respectively, manufacturing and trading firms.

The curves in these figures represent combinations of firm size and export relationship size that result in a certain level of export intensity. To examine the effect of export relationship size, consider the curve with an export intensity of 0.20 in Figure 1. If we increase export relationship size, given a certain firm size, we will have to shift to a higher export intensity curve. This holds for most curves in Figures 1 and 2, indicat-

FIGURE 1
EXPORT RELATIONSHIP SIZE, FIRM SIZE AND EXPORT INTENSITY FOR MANUFACTURING FIRMS

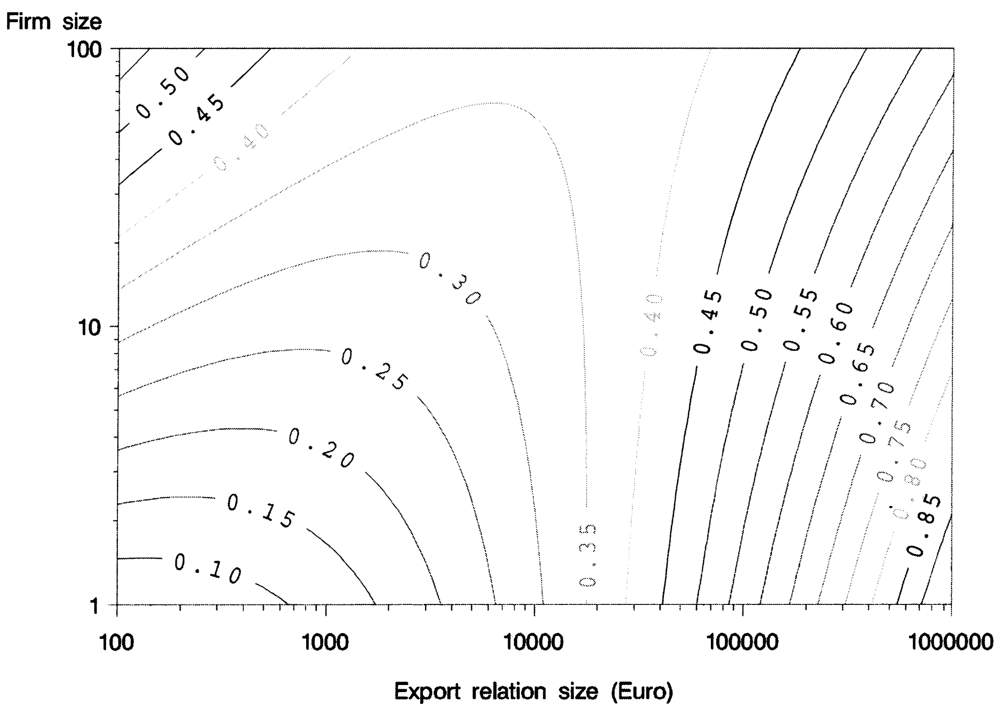
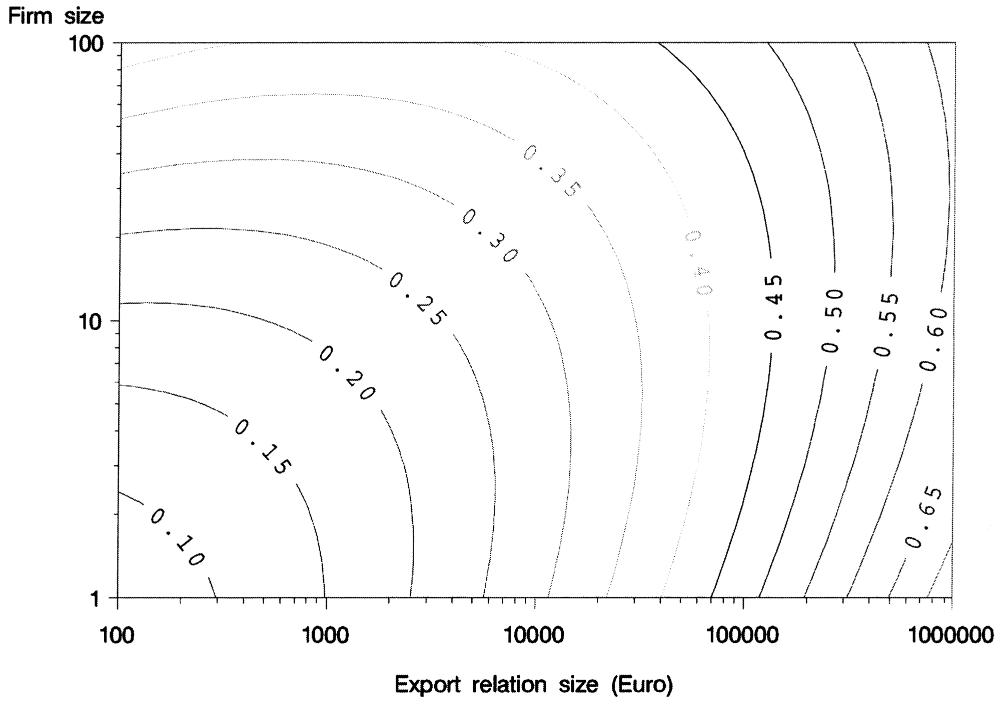


FIGURE 2
EXPORT RELATIONSHIP SIZE, FIRM SIZE AND EXPORT INTENSITY FOR TRADING FIRMS



ing that export relationship size has a positive effect on export intensity. Notable exceptions are the curves in the top left corners of Figures 1 and 2. However, there are only few observations in this area, so the curves in this region are mainly based on extrapolation of the functional form.

Let us now consider the relationship between firm size and export intensity, keeping the average size of export relationships fixed. For small export relationships, on the left in the figures, we see that changes in firm size result in considerable changes in export intensities. When export relationships become larger, i.e. we move to the right in the figure, we see that the same change in firm size results in smaller changes in export intensity, as the vertical distance between the lines increases. For manufacturing firms with large export relationships small firms even have higher export intensities than large firms, as increases in firm size result in shifts to curves with lower export intensities. With sizeable export relationships, small firms seem to have a competitive advantage in exports, compared to large firms. Small firms with large export relationships seem to benefit from their flexibility. From both figures it is clear that if we select a sample from an industry where export relationship size is large, we are likely to find an insignificant or negative relationship between firm size and export intensity, whereas in an industry where export relationship size is small, we are likely to find a positive relationship between firm size and export intensity.

For manufacturing firms, the firm size and export intensity relationship is positive if export relationship size is smaller than about Euro 10,000, then it is approximately flat, and beyond about Euro 25,000 it even becomes negative. Comparison of Figures 1 and 2 suggests that the moderating effect of export relationship size is stronger for manufacturing firms than for trading firms. Manufacturing firms have to co-ordinate more complex business functions such as production and product development in addition to other business functions. This means that quick and efficient adaptation may have more impact for manufacturing firms than for trading firms.

The mathematical specification of the regression model assumes a pattern that may not completely reflect the actual data. Therefore we apply a more robust test of the hypothesized pattern. For this, we calculate in Table 3 the Pearson correlation coefficients between firm size and export intensity for the total sample and for quartiles of the sample. These quartiles are based on the size of export relationships, where the first quartile contains the 25% of firms with the smallest export relationship size and the fourth quartile the 25% with the largest. Our theoretical framework predicts a positive relationship in the first quartile and a negative relationship in the fourth quartile. Furthermore, the correlations should decrease between the first and fourth quartiles. Finally, we would expect a rather low value for the correlation of the total sample, since it is the average of opposite values. The results in Table 3 corroborate these expectations. Identical patterns were found for manufacturing and trading firms separately.

We hypothesized that export relationship size has a positive influence on export intensity and a moderating effect on the firm size and export intensity relationship. This hypothesized pattern is clearly supported by the empirical findings presented in this paper. Economies of scale of transaction costs play a significant role in export management. However, these economies of scale should be related to the size of the export relationship, which does not necessarily co-vary with firm size. Small firms can realize economies of scale if they specialize in exports and develop export relationships of significant size. When export relationship size increases, the knife cuts two ways for small firms. They reduce their disadvantage of limited resources and higher need of governance, while they

TABLE 3
CORRELATIONS BETWEEN FIRM SIZE AND EXPORT INTENSITY BY QUARTILES OF EXPORT RELATIONSHIP SIZE

	Total Sample	1^{st} Quartile	2^{nd} Quartile	3^{rd} Quartile	4^{th} Quartile
R	0.040	0.341	0.177	0.039	−0.213
p-value	0.469	0.001	0.056	0.360	0.030
N	288	72	72	72	72

increase their advantage of quick and efficient adaptation.

The results of this study show that transaction costs analysis has important implications for the study of export relationships. However, the results of this study are limited by the single institutional setting, and more importantly this study does not differentiate the many different types of governance structures that can be used in export relationships. Future research could validate and extend the proposed theoretical framework by examining the use of different types of governance in export relationships and their impact on firm performance in different institutional settings.

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